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ST. ONGE STEWARD JOHNSTON & REENS, LLC
986 BEDFORD STREET
STAMFORD, CT 06905-5619

EXAMINER	
SMITH, PHILIP ROBERT	
ART UNIT	PAPER NUMBER
3739	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/657,110	HOEG ET AL.	
	Examiner	Art Unit	
	PHILIP R. SMITH	3739	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-19 and 21-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-19,21-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

[01] The objection to the drawings set forth in the Office action of 1/16/08 is withdrawn in view of the cancellation of claim 20.

Claim Rejections - 35 USC § 103

[02] The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

[03] The rejection of claims 14-17,19,21 as being unpatentable over Chen (6,702,736) in view of Fukunaga (6,346,940) is withdrawn in view of the amendments of 5/16/08.

[04] Claims 14-17, 19, 21-25, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (6,702,736) in view of Hale (2003/0114730) and in further view of Fukunaga (6,346,940).

[05] With regard to claim 14:

[05a] Chen discloses a method for improving a medical procedure; comprising:

- providing an endoscope ("endoscope 90" 4/48) having a shaft with a longitudinal axis and a variable view vector (see Figure 11);
- positioning the endoscope relative to an anatomical structure to acquire images of the structure;
- providing a first display of the images acquired by the endoscope ("video image data 210 obtained from endoscope 90" 9/25);
- providing a second display of a graphical model of the anatomical structure ("computer model image data 220" 9/26) simultaneously with the first display of the images of the anatomical structure acquired by the endoscope

("composite image 200" 9/24), wherein the graphical model is reconstructed from volumetric scan data of the anatomical structure ("anatomical 3-D computer models 160" 8/24);

- acquiring position data of the endoscope relative to the anatomical structure ("tracking system 97" 3-19).
- displaying a graphical model of the endoscope relative to the anatomical structure based on the position data and the volumetric scan data (see Figure 9 with reference to (10/35-41);

[05b] Chen does not disclose:

- that the variable view vector pivots relative to the longitudinal axis of the shaft;
- acquiring configuration data of the orientation of the view vector relative to the longitudinal axis of the endoscope shaft as the view vector pivots relative to the shaft;

[05c] Hale discloses:

- a variable view vector that pivots relative to the longitudinal axis of the shaft of an endoscope ("longitudinal direction 26" [0035]) and acquiring configuration data of the orientation of the view vector relative to the longitudinal axis of the endoscope shaft as the view vector pivots relative to the shaft ("a tracking means for providing view vector orientation information" [0027]).
- At the time of the invention, it would have been obvious to a person of ordinary skill in the art to enable a variable view vector such as that disclosed by Hale in the endoscope disclosed by Chen. A skilled artisan would be motivated to do so for the reasons stated in [0015] of Hale: "instead of moving the entire

endoscope, variable direction of view endoscopes should be controlled in a way that utilizes their internal direction of view adjustment systems".

[05d] Chen in view of Hale does not disclose:

- displaying a graphical representation of the endoscope in the second display;
- displaying in the second display a graphical model of the view vector relative the longitudinal axis of the endoscope based on the configuration data.

[05e] Fukunaga discloses:

- providing a first display of the images acquired by an endoscope ("main display 11a which displays an endoscopic image Ai" 5/54);
- displaying in a second display a graphical model of an anatomical structure ("subdisplay 11b which displays an outer shape image Bi" 5/55)
- displaying in the second display a graphical representation of the endoscope relative to the anatomical structure based on the position data and the volumetric scan data ("indicator image Ci" 8/61-67)
- displaying in the second display a graphical representation of the view vector ("red bar 37" 8/63) relative the longitudinal axis of the endoscope based on the configuration data.
- At the time of the invention, it would have been obvious to a person of ordinary skill in the art that to combine anatomic visualization system disclosed by Chen with the graphical representation of an endoscope relative to an anatomical structure as disclosed by Fukunaga. It is obvious to combine prior art elements according to known methods to yield predictable results. In combination, the anatomic visualization system and the graphical

representation of an endoscope would have performed the same function as they had separately; a skilled artisan would have recognized that the result of the combination was predictable.

[06] With regard to claim 15: As noted above, Fukunaga discloses displaying on the second display a graphical representation of the endoscopic view vector. Chen discloses a cone surrounding the view vector based on known "optical properties" of the endoscope (see Figure 11). A view cone, in addition to the vector disclosed by Fukunaga would offer the obvious advantage of borders of the displayed portion (see "software object 90B'" in Figure 4).

[07] With regard to claim 16: Fukunaga further discloses displaying on the second display a marker that indicates the up direction of the images acquired by the endoscope ("green hemisphere 35… indicates the reference direction" 8/65-67).

[08] With regard to claim 17: As noted above, Chen in view of Fukunaga discloses first and second displays are displayed on a single monitor. It would have been obvious to display them on first and second monitors, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ. Constructing two monitors having a single display each instead of a single monitor having two displays is essentially equivalent and well within the abilities of a skilled artisan.

[09] With regard to claim 19: Chen further discloses selecting a target point relative to the reconstructed anatomical structure ("markers 30E'" 11/45); and calculating a set of endoscope tip positions from which there is a direct line of sight to the target point. In the course of rendering target points within the first and second displays, Chen inherently

calculates an endoscope tip position from which there is a direct line of sight to the target point (as in Figure 12). Given that the target point will be rendered from any vantage point having a direct line of sight to the target point, there will inherently be a set of endoscope tip positions which is calculated in the normal course of use.

[10] With regard to claim 21: Chen in view of Fukunaga further discloses: selecting an entry path for the endoscope ("plan a surgical procedure" 11/46); calculating which of the endoscope tip positions for which there is a direct line of sight to the target point are intersected by the entry path (see Figure 12); and displaying the endoscope tip positions that are intersected by the entry path (see Figure 12).

[11] With regard to claim 22:

[11a] Chen discloses a method for improving a medical procedure; comprising:

- providing an endoscope ("endoscope 90" 4/48) having a shaft and a distal end with a longitudinal axis and a variable view vector (see Figure 11);
- positioning the endoscope relative to an anatomical structure to acquire images of the structure;
- providing a first display of the images acquired by the endoscope ("video image data 210 obtained from endoscope 90" 9/25);
- providing a second display of a graphical model of the anatomical structure ("computer model image data 220" 9/26) simultaneously with the first display of the images of the anatomical structure acquired by the endoscope ("composite image 200" 9/24), wherein the graphical model is reconstructed from volumetric scan data of the anatomical structure ("anatomical 3-D computer models 160" 8/24);

- acquiring position data of the endoscope relative to the anatomical structure ("tracking system 97" 3-19).
- displaying a graphical model of the endoscope relative to the anatomical structure based on the position data and the volumetric scan data (see Figure 9 with reference to (10/35-41);

[11b] Chen does not disclose:

- that the variable view vector pivots relative to the longitudinal axis of the shaft;
- acquiring configuration data of an internal view changing mechanism in the distal end of the shaft that pivots the view vector pivots relative to the longitudinal axis of the shaft;

[11c] Hale discloses:

- a variable view vector that pivots relative to the longitudinal axis of the shaft of an endoscope ("longitudinal direction 26" [0035]) and acquiring configuration data of the orientation of the view vector relative to the longitudinal axis of the endoscope shaft as the view vector pivots relative to the shaft ("a tracking means for providing view vector orientation information" [0027]).
- At the time of the invention, it would have been obvious to a person of ordinary skill in the art to enable a variable view vector such as that disclosed by Hale in the endoscope disclosed by Chen. A skilled artisan would be motivated to do so for the reasons stated in [0015] of Hale: "instead of moving the entire endoscope, variable direction of view endoscopes should be controlled in a way that utilizes their internal direction of view adjustment systems".

[11d] Chen in view of Hale does not disclose:

- displaying a graphical representation of the endoscope in the second display;
- displaying in the second display a graphical model of the view vector relative the longitudinal axis of the endoscope based on the configuration data.

[11e] Fukunaga discloses:

- providing a first display of the images acquired by an endoscope ("main display 11a which displays an endoscopic image Ai" 5/54);
- displaying in a second display a graphical model of an anatomical structure ("subdisplay 11b which displays an outer shape image Bi" 5/55)
- displaying in the second display a graphical representation of the endoscope relative to the anatomical structure based on the position data and the volumetric scan data ("indicator image Ci" 8/61-67)
- displaying in the second display a graphical representation of the view vector ("red bar 37" 8/63) relative the longitudinal axis of the endoscope based on the configuration data.
- At the time of the invention, it would have been obvious to a person of ordinary skill in the art that to combine anatomic visualization system disclosed by Chen with the graphical representation of an endoscope relative to an anatomical structure as disclosed by Fukunaga. It is obvious to combine prior art elements according to known methods to yield predictable results. In combination, the anatomic visualization system and the graphical representation of an endoscope would have performed the same function as they had separately; a skilled artisan would have recognized that the result of the combination was predictable.

[12] With regard to claim 23: As noted above, Fukunaga discloses displaying on the second display a graphical representation of the endoscopic view vector. Chen discloses a cone surrounding the view vector based on known "optical properties" of the endoscope (see Figure 11). A view cone, in addition to the vector disclosed by Fukunaga would offer the obvious advantage of borders of the displayed portion (see "software object 90B'" in Figure 4).

[13] With regard to claim 24: Fukunaga further discloses displaying on the second display a marker that indicates the up direction of the images acquired by the endoscope ("green hemisphere 35… indicates the reference direction" 8/65-67).

[14] With regard to claim 25: As noted above, Chen in view of Fukunaga discloses first and second displays are displayed on a single monitor. It would have been obvious to display them on first and second monitors, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ. Constructing two monitors having a single display each instead of a single monitor having two displays is essentially equivalent and well within the abilities of a skilled artisan.

[15] With regard to claim 27: Chen further discloses selecting a target point relative to the reconstructed anatomical structure ("markers 30E'" 11/45); and calculating a set of endoscope tip positions from which there is a direct line of sight to the target point. In the course of rendering target points within the first and second displays, Chen inherently calculates an endoscope tip position from which there is a direct line of sight to the target point (as in Figure 12). Given that the target point will be rendered from any vantage point

having a direct line of sight to the target point, there will inherently be a set of endoscope tip positions which is calculated in the normal course of use.

[16] With regard to claim 28: Chen in view of Fukunaga further discloses: selecting an entry path for the endoscope ("plan a surgical procedure" 11/46); calculating which of the endoscope tip positions for which there is a direct line of sight to the target point are intersected by the entry path (see Figure 12); and displaying the endoscope tip positions that are intersected by the entry path (see Figure 12).

Additional Claim Rejections - 35 USC § 103

[17] Claims 18, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (6,702,736) in view of Hale (2003/0114730) and Fukunaga (6,346,940) and in further view of Schulz (5,920,395).

[18] Chen discloses that "tracking system 97 might comprise an optical tracking system" (5/26-27). Chen does not disclose that "tracking system 97" particularly comprises a plurality of cameras to track light emitting diodes on the endoscope.

[19] Schulz discloses that "[t]hree light sensors 20, 22, and 24 sense the light projected by the individual light emitters 14, 16 and generate electrical output signals from which are derived the location of the probe 12 and, consequently, the probe tip 18, with respect to the fixed coordinate system 80" (5/30-35). Schulz further discloses that the light emitter may be LEDs (7/10).

[20] At the time of the invention, it would have been obvious to a person of ordinary skill in the art that the optical tracking system disclosed by Schulz be substituted for the optical tracking system disclosed by Chen. It is obvious to substitute one known element for another to obtain predictable results. Optical tracking systems are known in the art, as are

camera/LED optical tracking systems. A skilled artisan could have substituted one for the other, and the resulting substitution would have been predictable.

Response to Arguments

[21] Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

[22] Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

[23] A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

[24] Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHILIP R. SMITH whose telephone number is (571)272-6087 and whose email address is philip.smith@uspto.gov. The examiner can normally be reached between 9:00am and 5:00pm.

[25] If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda Dvorak can be reached on (571) 272 4764.

[26] Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Philip R Smith/

Examiner, Art Unit 3739

/Linda C Dvorak/

Supervisory Patent Examiner, Art Unit 3739